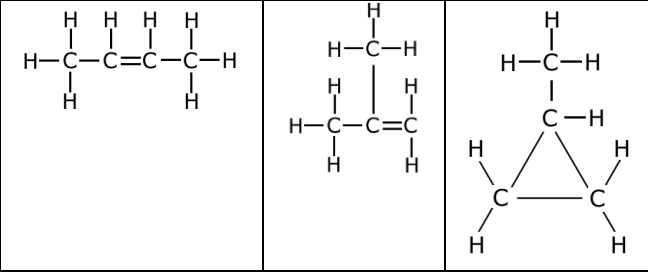


Question number	Answer	Accept	Reject	Marks
1 (a) (i)	poly(ethene)	polyethene / polythene / polyethylene		1
(ii)	cracking			1
(b) (i)	M1 - bar labelled 9 M2 - drawn to correct height			1 1
(ii)	(boiling point/it) increases as number of carbon atoms increases	ORA as one goes up, the other goes up positive correlation	(directly) proportional	1

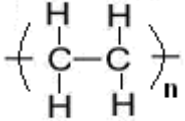
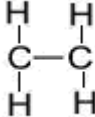
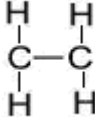
Question number	Answer	Accept	Reject	Marks
1 (c)	<p><u>A/buried underground</u> because</p> <p>Any two from:</p> <ul style="list-style-type: none"> • M1 (plastics) do not produce carbon dioxide/carbon emissions / toxic / poisonous gases <p>IGNORE harmful/dangerous/polluting gases / sulfur dioxide</p> <ul style="list-style-type: none"> • M2 (plastics) do not contribute to global warming /climate change / greenhouse effect / acid rain • M3 Does not pollute the <u>soil</u> / cause damage to the <u>soil</u>. <p>IGNORE references to effect on wildlife/habitats / cost</p> <p>OR</p> <p><u>B/burned</u> because</p> <ul style="list-style-type: none"> • M1 (burning) space in landfill not taken up / does not cause landfill sites to get filled up / will not run out of space for landfills • M2 it provides heat / can be used to generate electricity <p>IGNORE just provides energy</p>	<p>ORA</p> <p>carbon monoxide / nitrogen dioxide / hydrogen chloride / chlorine / formulae</p>	<p>References to ozone layer for M2 only</p>	<p>1</p> <p>1</p> <p>OR</p> <p>1</p> <p>1</p> <p>7</p>
			Total	

Question number	Answer		Accept	Reject	Marks
2 (a)	M1 temperature after	27.1	one trailing zero	more than one trailing zero	3
M2 temperature before	18.8				
M3 temperature change	(+) 8.3				
<p>Recorded temperatures correct but in wrong order scores 1 for M1 and M2</p> <p>M3 csq on M1 and M2</p>					
(b)	<p>M1 heat (energy) /thermal energy lost (to the atmosphere) ignore just energy lost</p> <p>M2 potassium hydroxide dissolves (very/too) slowly</p>		<p>water evaporates</p> <p>potassium hydroxide does not completely dissolve</p> <p>potassium hydroxide is impure</p> <p>less than 3 g of potassium hydroxide is used</p> <p>more than 50 cm³ of water is used</p>		2

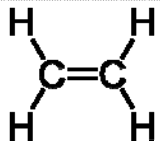
Total 5 marks

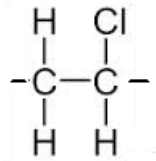
Question number	Answer	Notes	Marks
3 (a) (i)	<p>M1 (compounds/molecules with the) same molecular formula /same number of each type of atom</p> <p>M2 but different displayed formula / structural formula / structures / arrangement of atoms</p>	<p>Ignore references to chemical/general/empirical formula</p> <p>If use elements/atoms instead of compounds/molecules can score M2 only</p> <p>Allow reference to isomers in question ie have same number of carbon and hydrogen (atoms as each other)</p> <p>Ignore atoms in different order</p> <p>Ignore references to stereoisomerism</p>	2
(ii)	 <p>Any one for 1 mark</p>	<p>Accept structure of trans but-2-ene</p> <p>Ignore bond angles</p>	1
(iii)	<p>M1 (Reagent) – bromine (water)</p> <p>M2 (But-1-ene) – goes (from orange) to colourless</p> <p>M3 (cyclobutane) – no change (unless UV light present)</p>	<p>accept decolourised</p> <p>Ignore clear/discolours</p> <p>accept stays orange</p> <p>ignore no reaction</p> <p>If start with bromine (water) in presence of UV light then scores 0/3</p>	3

<p>(b) (i)</p>	$ \begin{array}{cccc} & \text{H} & \text{H} & \text{H} & \text{H} \\ & & & & \\ \text{H} & -\text{C} & -\text{C} & -\text{C} & -\text{C}-\text{H} \\ & & & & \\ & \text{H} & \text{OH} & \text{H} & \text{H} \end{array} $ <p>OR</p> $ \begin{array}{cccc} & \text{H} & \text{H} & \text{H} & \text{H} \\ & & & & \\ \text{H} & -\text{C} & -\text{C} & -\text{C} & -\text{C}-\text{H} \\ & & & & \\ & \text{OH} & \text{H} & \text{H} & \text{H} \end{array} $	<p>Allow -O-H and -OH but not -HO</p>	<p>1</p>
<p>(ii)</p>	$ \left(\begin{array}{cc} \text{H} & \text{H} \\ & \\ -\text{C} & -\text{C}- \\ & \\ \text{C}_2\text{H}_5 & \text{H} \end{array} \right)_n $ <p>M1 correct formula of repeat unit (with carbon to carbon single bond)</p> <p>M2 brackets <u>and</u> continuation bonds <u>and</u> n</p>	<p>Accept displayed C₂H₅</p> <p>Accept C₂H₅ on either C Allow if more than one monomer correctly joined together</p> <p>Accept n anywhere after brackets but not before</p> <p>M2 dep on M1 or near miss</p>	<p>2</p>

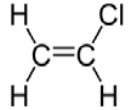
4 (b) (i)	H ₂ O			1
	(ii) Dehydration	Elimination		1
(c)	  1 mark for  i.e. double to single 1 mark for rest of formula, including extension lines, brackets and the 'n'	CH ₂ - CH ₂ n as superscript Max 1 for skeletal formula	Any double-bonded product scores 0/2 n before the brackets	2

Total 7 Marks

Question number		Answer	Notes	Marks	
5	a	cross in box C (fractional distillation)		1	
	b	M1 larger molecules in crude oil	Accept longer (chains)/ bigger M_r in place of larger Accept molecules in crude oil have wide range of sizes AND molecules in kerosene have similar sizes	4	
		M2 more covalent bonds in crude oil (molecules) / bonds have different strengths	Accept no difference / same type of covalent bonding Reject references to double bonds in kerosene		
		M3 crude oil has higher viscosity	Accept less runny / less thick		
		M4 correct reference to other difference - eg crude oil darker colour crude oil harder to ignite crude oil burns with a smokier flame crude oil has a higher boiling point / wider range of boiling points			
			Any three points from four Accept converse statements for (molecules in) kerosene		
	c	i	C_9H_{20}	Accept $H_{20}C_9$	1
		ii	pentane		1
		iii		Ignore bond angles Ignore dot and cross diagram Ignore non-displayed formulae	1

Question number		Answer		Notes	Marks	
5	d	M1		M1 for 4 correct atoms joined to 2 C atoms (ignore C=C and extra atoms joined to C) Accept Cl in any position of four M2 for all 7 bonds correct provided that continuation bonds are shown but have no atoms attached Cl ₂ in place of Cl but otherwise correct scores M2 but not M1 Ignore brackets and any subscript	1	
		M2			1	
	e	i	(in condensation polymerisation) a small molecule/H ₂ O/HCl is (also) formed /lost/released OR two (different) monomers / more than one product	Accept converse statement for addition polymerisation eg (only) one product formed / no atoms are lost/gained	1	
				If no reference to type of polymerisation, assume that condensation is referred to		
		ii	M1	breakdown / decomposition	Ignore wear away / rot	1
			M2	by bacteria/microbes/micro-organisms	Accept biologically / naturally M2 dep on M1 or near miss	1
		iii		inert(ness)	Accept unreactive / non-polar Ignore strong bonds / long chains	1
TOTAL					13	

Question number	Answer	Accept	Reject	Marks
6 (a)	$C_{12}H_{22}O_{11} + H_2O \rightarrow 2C_6H_{12}O_6$ Ignore yeast		lower case symbols and numbers not given as subscripts	1
(b) (i)	no more bubbles/fizzing/effervescence IGNORE when no more ethanol is formed/all the glucose has reacted/all the yeast has reacted/references to mass/references to temperature	no more gas/carbon dioxide given off		1
(ii)	filtration/filtering IGNORE sieving	decant	evaporation/distillation	1
(c) (i)	(the elements of) water removed	H ₂ O removed 2 hydrogen (atoms) and 1 oxygen (atom) are removed		1
(ii)	aluminium oxide/Al ₂ O ₃	(concentrated) sulfuric acid (concentrated) phosphoric acid	dilute acid phosphorus/phosphorous	1
(iii)	chlorine (gas) / Cl ₂ If both name and formula given, both must be correct	correct name or formula as part of an equation	chloride / Cl ⁻	1
(iv)	$CH_2ClCH_2Cl \rightarrow CH_2(=)CHCl + HCl$	C ₂ H ₄ Cl ₂ for CH ₂ ClCH ₂ Cl and C ₂ H ₃ Cl for CH ₂ =CHCl		1

Question Number	Answer	A	Reject	Marks
(d) (i)	 <p data-bbox="310 420 997 482">IGNORE bond angles and positions of H and Cl relative to each other</p>			1
(ii)	<p data-bbox="310 529 571 561">Any three from:</p> <p data-bbox="310 600 951 631">M1 - (one bond in the) double bond breaks</p> <p data-bbox="310 671 1012 733">M2 - small molecules/monomers/chloroethene molecules join together</p> <p data-bbox="310 773 951 804">M3 - to form a (long) chain/macromolecule</p> <p data-bbox="310 843 1035 874">M4 - product/polymer contains only single bonds</p>			3
			Total	11